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U. S. DEPARTMENT OF AGRICULTURE.

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FARMERS' BULLETIN 548.

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# STORING AND MARKETING SWEET POTATOES.

BY

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# LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,  
BUREAU OF PLANT INDUSTRY,  
OFFICE OF THE CHIEF,  
Washington D. C., May 17, 1913.

SIR: I have the honor to transmit herewith a manuscript entitled "Storing and Marketing Sweet Potatoes," prepared by Mr. H. C. Thompson, Assistant Horticulturist, and recommend that it be published as a Farmers' Bulletin to replace Farmers' Bulletin 520, entitled "The Storing and Marketing of Sweet Potatoes."

The results of the work during the past season put in our possession information which makes it desirable to make this change. The great number of inquiries which have been received regarding the best methods of constructing storage houses makes it necessary to give plans and specifications for such buildings, which have been included as a part of the present bulletin.

Respectfully,

WM. A. TAYLOR,  
*Chief of Bureau.*

Hon. D. F. HOUSTON,  
*Secretary of Agriculture.*

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# STORING AND MARKETING SWEET POTATOES.

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## INTRODUCTION.

Each year the sweet potato is becoming of greater importance as a money crop in the South. The value of this crop in the United States in 1909 was \$34,429,000, 90 per cent of which was produced in the Southern States. The total area devoted to sweet potatoes in the United States increased from 537,000 acres in 1899 to 641,000 in 1909, and the yield increased from 42,500,000 to 52,200,000 bushels. The total value of the crop increased at a much more rapid rate than either the acreage or yield, showing an increase of 78.3 per cent in 10 years.

With better methods of storing and marketing the potatoes, their value could be doubled without increasing the acreage or production. This is especially true in the South, where the potatoes are either rushed on the market at digging time, when the price is low, or stored in outdoor pits or banks, where a large portion decay. Very few of the sweet potatoes stored in pits or banks ever reach the market, for from 25 to 50 per cent spoil and those that remain are not of good quality. Even if the pit or bank method of storage would keep the potatoes it is not economical. Too much labor and expense are required to make these banks every year and to get the potatoes out when wanted for market. Sweet potatoes can be marketed more economically and to much better advantage from storage houses. It is not advisable to open a bank when the soil is wet or the weather cold, as these conditions injure the potatoes and cause them to decay. Outdoor pits and banks can not be depended on. Some years a very small number of the potatoes spoil in banks, while in other years practically the whole crop is lost. The only safe and practicable method of storing sweet potatoes is in a storage house, as the potatoes can be taken out at any time without subjecting them to unfavorable conditions.

To keep sweet potatoes in good condition they must be (1) well matured before digging, (2) carefully handled, (3) well dried or

cured after being put in the house, and (4) kept at a uniform temperature after they are cured.

The grower can judge when his sweet potatoes are ripe by breaking or cutting the tubers and leaving them exposed to the air for a few minutes. If the cut or broken surface dries they are mature, but if the surface remains moist they are not ready to be dug. In regions where early frosts occur the sweet potatoes should be dug about the time the first frost is expected, regardless of the stage of maturity of the tubers.

The second essential, careful handling, is of the greatest importance and should be practiced in digging, gathering, hauling, and unloading. The potatoes should be sorted in the field and gathered in padded baskets or boxes to prevent bruising or breaking the skin. The baskets or boxes should be loaded on the wagon, hauled to the storage house, and the potatoes carefully poured into the bins. When they are to be hauled very far a wagon with bolster springs should be used. Sweet potatoes should never be thrown from one row to another, loaded loosely into a wagon body, or hauled in bags, because any of these methods will bruise them and give a chance for disease to enter.

The third and fourth essentials, thorough drying and a uniform temperature, can be secured in a storage house where artificial heat can be supplied. It is essential that the house be constructed in such a way that it can be thoroughly ventilated when necessary, but can be made nearly air tight in cold weather. These requirements are provided for in the type of house described in this bulletin.

It is economy to build a substantial sweet-potato storage house, because it will last longer and require less attention than a cheap, poorly constructed one. It would be possible to keep sweet potatoes in a cheaper and less carefully constructed house, but the attention required and the additional fuel used would soon exceed the cost of the extra care and material required in a better one. The chances of loss are much greater in a poorly built than in a well-built house.

### **CONSTRUCTION OF A SWEET-POTATO STORAGE HOUSE.**

Sweet-potato storage houses may be built of wood, brick, cement, or stone. Wooden houses are preferable because they are cheaper and easier to keep dry. It is difficult to keep moisture from collecting on the walls of a cement, stone, or brick house. The house should be built on posts or piers, so as to allow a circulation of air under it. The "dugout," or a house built partly under ground, should never be used in the South for storing sweet potatoes, because it is practically impossible to keep this type of house dry, and moisture in the storage house will cause the potatoes to rot.

In building a storage house the sills should be placed on posts or pillars 12 to 15 inches from the ground or just high enough for the wagon bed to be on a level with the floor of the house. The size of the house will depend on the quantity of potatoes to be stored. A house 20 by 40 feet, built according to the plans shown in figures 1 to 4, will hold from 2,500 to 3,000 bushels. This type of house may be constructed as follows:

Three rows of pillars should be built, one under each side and one under the center of the house, using cement, brick, or wooden blocks. On the pillars sills 8 by 8 or 8 by 10 inches should be placed and on these 2 by 8 or 2 by 10 inch sleepers. Over the sleepers a rough floor of 1 by 4 or 1 by 6 inch boards should be laid, then a layer of heavy building paper, and over this matched flooring. The walls of

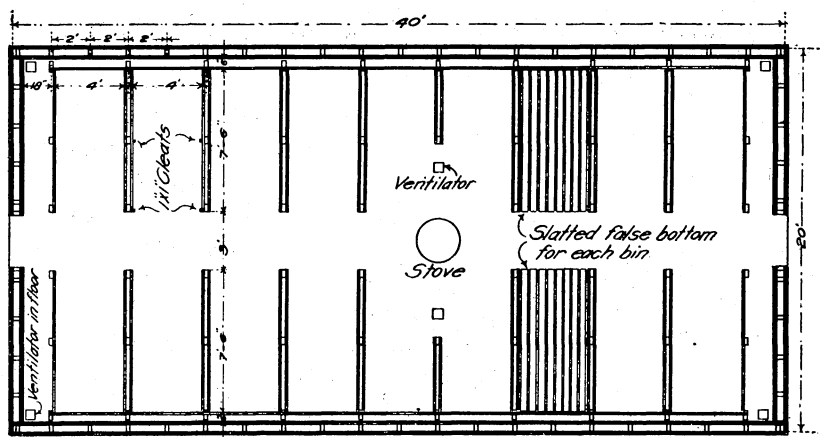


FIG. 1.—Ground plan of a good type of sweet-potato storage house.

the house should be built by placing 2 by 4 or 2 by 6 inch studding every 2 feet. On the outside a layer of 1 by 6 inch boards should be nailed diagonally to brace the wall; over these a layer of heavy building paper should be placed, and then matched siding. The inside of the building should be ceiled with 1 by 6 inch rough boards, then a layer of heavy building paper, and over this matched boards or wainscoting. In the lower South the first layer of boards on the inside may be omitted and the paper tacked to the studding, the matched boards being nailed over this. The sides should be well tied together and for this purpose 2 by 4 inch scantling placed 4 feet apart, so as to be over the partitions for the bins, will be satisfactory. The roof may be made of shingles, roofing paper, tin, or galvanized iron. Galvanized iron is preferable because it is the most durable and lessens danger from fire. Use 2 by 4 or 2 by 6 inch scantling for rafters and make the roof tight, so as to keep out the cold. It is a good plan to put a layer of building or roofing paper over the rafters.

under the roofing material. On the inside of the rafters nail a layer of unmatched boards, then a layer of heavy building paper, and over this a layer of matched material.

The space between the walls should be left open, because any material used to keep out the cold will take up moisture. Many storage

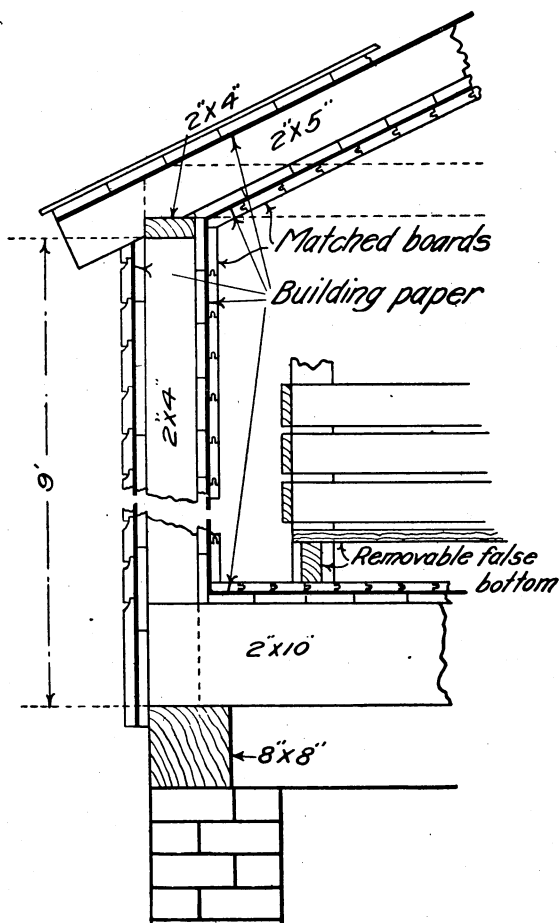


FIG. 2.—Details of construction of a sweet-potato storage house.

houses have been built with sawdust, shavings, or similar material between the walls, but this practice should never be followed. Sawdust will take up moisture and when once wet will never dry out. This moisture will keep the house damp and cause the walls to rot. The air space is as good an insulator as the sawdust if the walls are made tight, and they will be if the plans given here are followed.

Thorough ventilation is necessary in a storage house. To secure this there should be three windows on each side, a door in each end of a 20 by 40 foot house, at least two ventilators through the roof,

a ventilator in the floor in each corner of the house and one on each side of the stove. In a smaller house it may not be necessary to have more than one door. In this case there should be a window in the back of the house and a door in front. The bottom of the windows should be within 18 inches or 2 feet of the floor. The windows and doors must be made so as to close tightly to keep out the cold. A good plan is to make the doors and windows like those shown in figure 5. All windows should be made to open from the outside, as

the bins will be in the way of opening from the inside. Where glass windows are used, outside shutters are put on, as shown in figure 6, and these should be well padded. Some of the windows should be

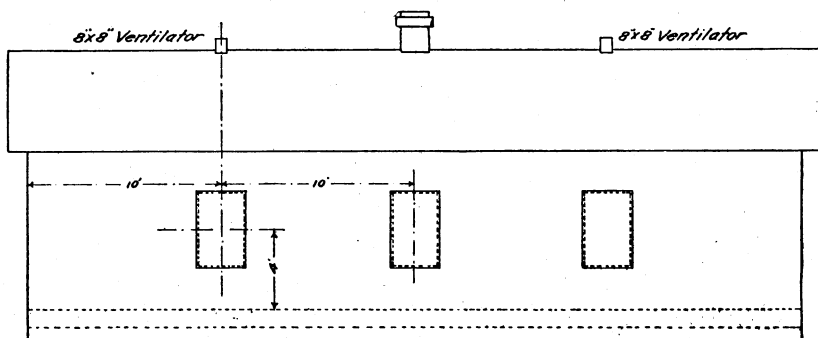


FIG. 3.—Side elevation of a sweet-potato storage house.

made of glass, so as to admit light without letting in cold air, as it is necessary to have light when working in the house, and in cold weather the house should not be kept open. All of the openings must be made so they can be closed quickly and tightly whenever necessary.

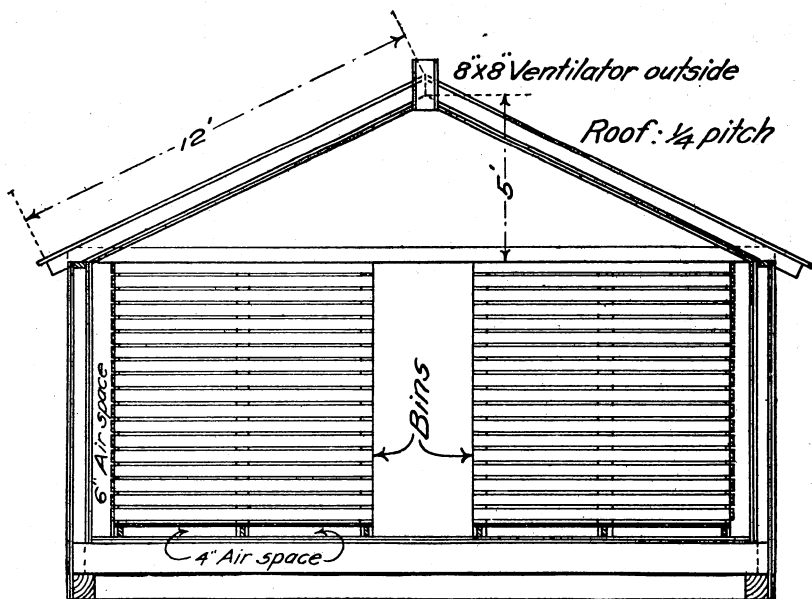


FIG. 4.—Cross section of a sweet-potato storage house.

The ventilators in the roof should extend through the ceiling, so as to carry out the warm air as it rises. Ventilators 8 by 8 or 10 by 10 inches, made of wood, are very satisfactory. These should be provided with a roof to keep out rain and at the bottom end with



a tight-fitting shutter, which can be closed in cold weather. The ventilators in the floor may be holes 12 by 12 inches, but they should be provided with tight-fitting covers, so that they can be closed when necessary.

The interior of the house should be arranged for convenience in handling the potatoes. It should be divided into bins of convenient size so constructed as to allow air to circulate around the potatoes. A good arrangement of a passageway and bins is shown in the ground plans, figure 1.

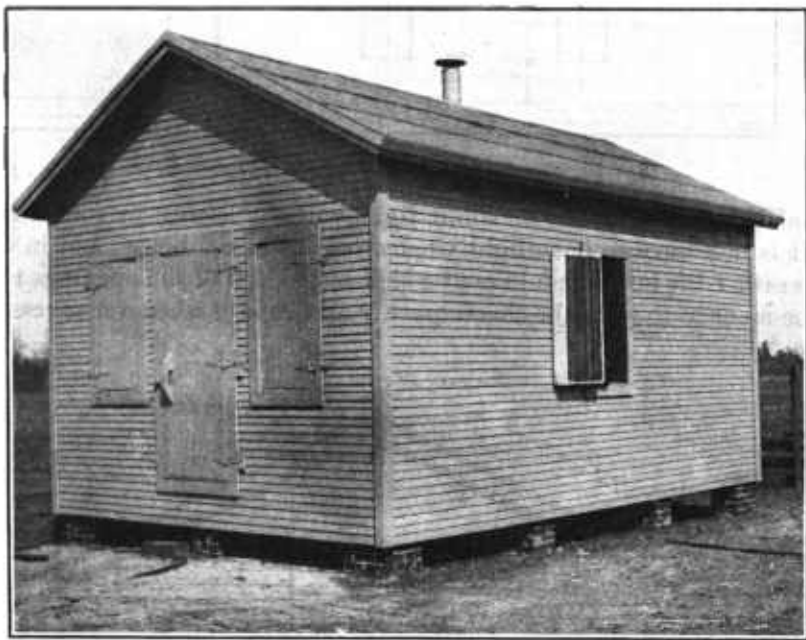


FIG. 5.—A good type of sweet-potato storage house, but more expensive than necessary. This house is 14 by 20 feet and is heated by an oil stove.

The bins are made as follows: For the corner and middle supports 2 by 4 inch scantlings should be set up, the lower end nailed to the floor, and the upper to the crosspieces used for tying the sides together. Over the supports 1 by 4 inch boards should be nailed, leaving a 1-inch space between them. The ends of the bins parallel with the outside wall of the house must be built first, because there is not room enough to work between the bin and the outside wall. In making the floors 2 by 4 inch scantlings should be cut to go across the bin and placed on edge, one near each end and one in the center. To these should be tacked 1 by 4 inch boards, leaving a 1-inch space between them. The bin floor should not be fastened to the floor of the house. If left loose it can be taken out when the house is cleaned

and disinfected during the summer. The size of the bins will depend somewhat on the arrangement and size of the house. The bins shown in figures 1 and 4 are 4 feet wide,  $7\frac{1}{2}$  feet long, and 8 feet deep, which is a convenient size. There should be a 6 to 12 inch space between the walls and the bins, to allow a circulation of air. It is advisable to slat up both sides of the scantlings between the bins in order to leave an air space between the potatoes in the different bins. The construction here described allows a 4-inch air space between the bins, a 4-inch space under the bins, and 6 inches between the bins and outside walls.

On many farms in the South there are buildings, such as abandoned tenant houses, that could be converted into sweet-potato storage houses at very little expense. Where there are such buildings they

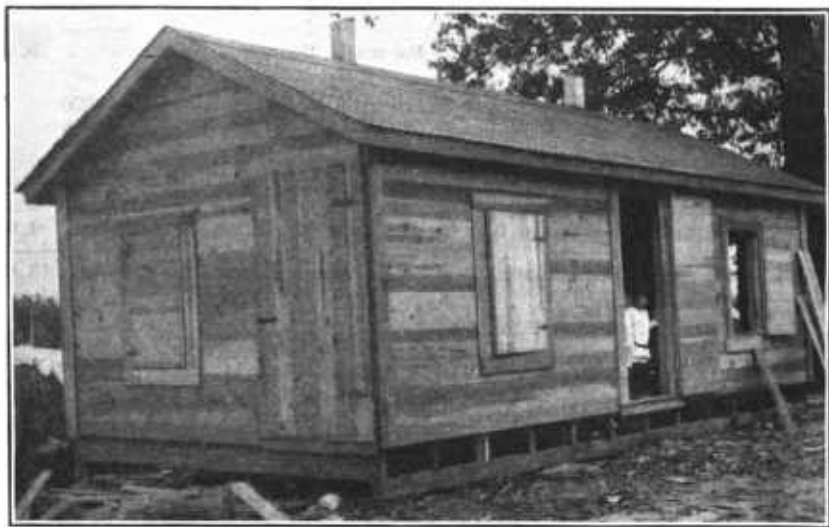


FIG. 6.—A satisfactory sweet-potato storage house, 12 by 24 feet, costing about half as much as the one shown in figure 5.

should be used rather than to build a new house. These houses will usually need to be ceiled on the inside. For this purpose 2 by 4 inch scantlings should be set against the wall and covered first with building paper and then a layer of matched lumber. The windows and doors should be made tight and ventilators put in where needed. The bins may be made as already described.

#### **MATERIAL REQUIRED FOR A 20 BY 40 FOOT STORAGE HOUSE.**

It is not practicable to give the cost of a sweet-potato storage house, because of the difference in the price of materials and labor in different sections of the country. Given the amount of material

required it will be easy for anyone to secure estimates on the cost of the materials in his locality. For a house 20 by 40 feet built after the plans given in this bulletin it will require approximately the following materials:

Lumber for storage house proper:		Board feet.
Sills, 8 pieces 8 by 8 inches by 20 feet.....	860	
Sleepers, 21 pieces 2 by 10 inches by 20 feet.....	700	
Studding, 64 pieces 2 by 6 inches by 9 feet.....	576	
Rafters, 42 pieces 2 by 6 inches by 12 feet.....	504	
Tying sides, 10 pieces 2 by 4 inches by 20 feet.....	135	
Plates, 6 pieces 2 by 6 inches by 20 feet.....	120	
Material, rough boards, miscellaneous lengths, for inner walls, floor, etc .....	4,500	
Flooring.....	960	
Dressed tongue-and-groove material.....	2,600	
Drop siding.....	1,500	
Total number of board feet for the walls, floor, and ceiling.....		9,560
Lumber for bins:		
Bin supports, 60 pieces 2 by 4 inches by 8 feet.....	320	
Floor supports, 60 pieces 2 by 4 inches by 4 feet.....	160	
Sides and ends of bins, 1 by 4 inches, miscellaneous lengths.....	3,000	
Floor of bins, 1 by 4 inches, miscellaneous lengths.....	560	
Total number of board feet for bin material.....		4,040
Total amount of lumber.....		13,600
Miscellaneous material:		
4,500 square feet of building paper.		
10 squares of galvanized-iron roofing.		
1 stove.		
1,000 bricks for chimney and pillars.		
8 pairs of hinges for doors and windows.		
200 pounds of nails.		
2 doors.		
6 windows.		
1 flue plate and hanger.		

### VARIETIES OF SWEET POTATOES FOR MARKET.

The varieties of sweet potatoes to grow depend on the market to be supplied. The northern and eastern markets demand a dry, mealy potato, such as the Big-Stem Jersey, including the so-called Improved Jersey, Yellow Nansemond, Early Carolina, Gold Coin, and others. The markets of the South demand a moist, sweet root. Among the varieties most in demand in the South are the Nancy Hall, Dooley Yam, Pumpkin Yam, and Triumph. The southern farmers should supply their own markets before trying to ship their potatoes to the northern markets. During the late winter and spring the larger cities of the South get sweet potatoes from regions in the North, because they can not secure the southern varieties at that time. With

storage houses, these markets could be supplied with southern-grown potatoes throughout the season. The markets of the West will take the moister fleshed potatoes grown in the South, and a good trade could be built up in this region.

While the varieties of sweet potatoes grown in the South are preferred by the southern people, the dry, mealy roots sell best in the markets of the North. The grower should aim to give the consumers what they want, and when growing sweet potatoes for northern markets the Big-Stem Jersey should be grown, regardless of the grower's preference.

### HARVESTING SWEET POTATOES.

Careful handling is one of the essentials in keeping sweet potatoes, and there is no more important place to practice it than in the field at digging time. The implement used to dig sweet potatoes should be one that does not cut or bruise the roots. One of the best types of diggers is a plow with rolling colters on the beam to cut the vines and with rods attached to the moldboard to free the roots from the soil and vines. (Fig. 7.) After the potatoes are dug

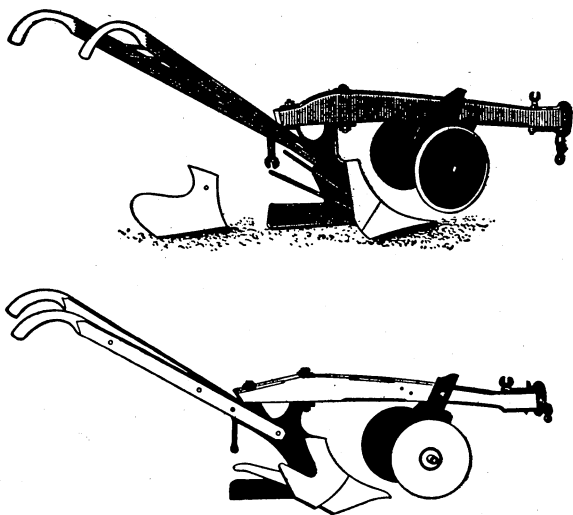


FIG. 7.—Special plows used for digging sweet potatoes.

they should be scratched out by hand and allowed to remain exposed long enough to dry off. The digging should be done, if possible, when the weather is bright and the soil is dry.

The potatoes should be graded in the field in order to reduce the cost of handling to a minimum. A good plan is to go over the rows and pick up the sound, marketable potatoes in one basket, then gather all of the seed stock in another basket or box, and the injured ones in still another. These lots should be stored in different bins. By following this method it will not be necessary to grade the potatoes at the storage house and will thus save time and reduce the cost of handling. The potatoes should be poured into the bins as carefully as possible, to prevent bruising. Sweet potatoes can be stored in boxes, hampers, baskets, or bins with equally satisfactory

results. The preference of the individual grower will determine the method to be employed.

Each year after the sweet potatoes have been marketed the house should be thoroughly cleaned and disinfected before being used again. All dirt and refuse should be cleaned out and all parts of the interior sprayed or washed thoroughly with a solution of formalin (1 pint of formalin to 10 or 15 gallons of water). Diseased roots should not be thrown on the manure pile or on land to be used for sweet potatoes, the safest plan being to burn them.

In filling the storage house the workmen should begin at the back end of the bins and pour a layer of potatoes about 2 feet deep in all of the bins rather than fill one bin at a time. If the bins are 8 or 10 feet long it is a good plan to divide them into two parts. By nailing cleats to the middle support of the bins, as shown in figure 1, the partition can be raised as the bins are filled. The partition boards should have some space between them to allow free circulation of air. A 1-inch block between the boards will be satisfactory to separate them. By dividing the bins in this way the back of the bin can be filled without walking over the potatoes in the front part. When taking the potatoes out, those in one section of a bin can be removed without disturbing the remainder. This is very important where the potatoes are sold in small quantities.

While the potatoes are being brought in, a fire should be kept up in the storage house to dry off the moisture. A temperature of 80° to 85° F., with plenty of ventilation, should be maintained for 10 days or 2 weeks, depending on weather conditions and the variety of potatoes. Ventilation is absolutely necessary, and even if it is not possible to keep the temperature up to 80° F. it is necessary to leave the ventilators open, so as to drive out the moisture-laden air. The house may be closed at night, and should be kept closed on cloudy days, but if moisture begins to deposit on the walls or ceiling the house should be opened and a fire started to drive off the moisture. The air inside the house should be kept warmer than the outside air during the curing period. This will prevent moisture from being deposited on the walls. As the air warms it expands and takes up moisture. When it cools it contracts and gives up its moisture. This makes it important to get the moisture-laden air out of the house by ventilation. When the potatoes are thoroughly dried or cured the temperature should be gradually reduced to 55° F. and kept as near that point as possible during the remainder of the storage period. If the temperature goes below 48° a fire should be made or the house opened in the middle of the day whenever the temperature on the outside is high enough. When the temperature goes above 60° F. the house should be opened in the cool of the day to lower the temperature to 54° or 55° and then closed. The house should have some ventilation

every day. In mild weather the ventilators in the roof may be partly open all the time, but they should be closed in cloudy or cold weather.

A small house can be heated with a sheet-iron stove that will burn knots and other pieces of wood. Coal stoves may be used if preferred, but the air-tight wood stoves will serve the purpose. It requires a longer time to get up heat with a coal stove than with a wood stove, and this is one disadvantage of the former. Many times all that is necessary to raise the temperature a few degrees is to start a little wood fire. In a commercial storage house a hot-water heater with pipes around the walls would be preferable to a stove, but even a house that will hold 10,000 to 25,000 bushels of potatoes may be heated with a good stove. The location of the stove in the house depends on the size of the house and the direction of the cold winds. Ordinarily the stove should be near the center of the house, but if the cold wind strikes one end the stove should be in that end. Some storage houses have a small stove in each end, and this is the best arrangement in a long house. Others have a stove in one end, with the pipe entering the chimney at the other end. Considerable open space should be left around the stove to prevent the potatoes from being injured by excessive heat.

### MARKETING SWEET POTATOES.

One reason why southern farmers have not received good prices for their sweet potatoes is that they have not used proper methods of handling and marketing. In many cases the potatoes are badly bruised and cut in digging, are put in bags or rough barrels without grading, and are rushed on the market when there is an oversupply. The secrets of success in getting high prices are (1) to carefully grade, clean, and pack the product and (2) to put it upon the market when there is a good demand. The greatest demand for sweet potatoes is, as a rule, from the middle of December to the middle of March.

When the potatoes are to be marketed they must be carefully graded, no matter how well it had been done when they were put in the house. The market demands a medium-sized, uniform type of sweet potato, free from bruises or decayed spots. In grading, the large, overgrown, and the crooked, broken, or bruised roots should be kept at home for feeding or for canning. The best potatoes will bring a higher price when separated from the culls. Two market grades are sometimes made—the “extra selects” or “primes” and the “seconds” or “pie stock”—but the southern farmer will do well to make just one market grade and keep the others for feeding to his live stock.

After carefully grading the potatoes they should be put in clean, neat, attractive packages. Bags should never be used, as the potatoes become badly bruised when handled in this way. The standard veneer potato barrel with a burlap cover, shown in figure 8, is usually used in summer or autumn, but for winter shipment the double-headed stave barrel or tight box is used. The smaller type of package, such as the bushel hamper (fig. 9), bushel box, or basket, is becoming more popular each year. A neat and attractive package of well-graded potatoes will bring a good price almost any time, even when the market is overstocked with inferior goods.

Potatoes shipped during the winter must be protected from the cold. When a sweet potato becomes chilled its quality is impaired and decay soon sets in.

In cold weather the package should be covered with paper and the cars heated to prevent chilling the potatoes. Some find it advantageous to line their baskets and barrels with paper.



FIG. 8.—Standard potato barrel, commonly used for the shipment of sweet potatoes during the summer months.

### SUMMARY.

The value of the sweet potato has increased about 80 per cent in the last 10 years. With better

methods of storing and marketing the present value could be doubled.

Sweet potatoes can be kept satisfactorily in a storage house where the temperature and moisture conditions can be controlled.

Sweet potatoes to keep well must be well matured, carefully handled, thoroughly cured, and kept at a uniform temperature while in storage.

Thorough ventilation is essential during the curing period.

The temperature should be kept at about 80° or 85° F. during the curing period and reduced gradually to 55° after the potatoes are cured.

Fluctuations of temperature should be avoided throughout the storage period.

The varieties of sweet potatoes that the markets demand should be grown.

The potatoes should be carefully graded, cleaned, and packed in neat and attractive packages.

Sweet potatoes should never be marketed in bags or in bulk.

Veneer barrels or bushel hampers are desirable packages to use during mild weather and double-headed stave barrels or tight boxes in cold weather.



FIG. 9.—Wagon adapted to hauling sweet potatoes from the field to the storage house or shipping point.

With the growing demand for sweet potatoes there is every inducement for the southern farmer to adopt better methods of growing and marketing, so as to make the sweet potato a more important money crop.